User manual IMG – Universal

Measuring inputs: Direct voltage, direct current, Pt100, Pt1000,
Thermocouple, frequency, rotational speed, counter

Technical features:

- red display of -1999…9999 Digits (optional 6 or 8 digits)
- digit height 57 mm or 100 mm, on request 200 mm
- protection class IP65
- wall mounting housing
- pressure balance membrane for air ventilation and de-airing
- display adjustment via factory setting or directly on the sensor signal
- min/max-value recording
- 9 additional, adjustable supporting points
- display flashing at threshold value exceedance/ threshold value undercut
- Tara-function
- Programming interlock via access code
- 2 switchingpoints (closer)
- brightness sensor
- optional: solid cable outlet 2m, 5m or 10m
- optional: connection via external keypad
- on request: communication via bluetooth
- accessories: PC-based configuration kit PM-TOOL with CD and USB-plug

Identification

STANDARD-TYPES	ORDER NUMBER
Digit height 57 mm	**IMG-AUR41.000X.S12AO** **IMG-AUR41.000X.712AO**
Digit height 100 mm	**IMG-AUR42.000X.S12AO** **IMG-AUR42.000X.712AO**

Options – break-down order code:

IM	G	-	A	U	R	4	1.	0	0	0	X.	S	1	2	A	O

Standard type M-line

Large-size display

Housing type

Wall-mounting	A

Display type

Universal measuring input	U

Display colour

red	R
green (on request)	G
blue (on request)	B
orange (on request)	O

Number of digits

4-digit	4
6-digit	6
8-digit	8

Digit height

57 mm	1
100 mm	2

Interfaces

none	0
RS232 Modbus protocol	3
RS485 Modbus protocol	4
Bluetooth module	B

Sensor supply

0	none
2	10 VDC / 20 mA
3	24 VDC / 50 mA

Analog output*

0	none
X	0/4-20 mA, 0-10 VDC

Measuring input

X	Direct voltage, direct current, Pt100(0), thermocouple, counter, frequency

Supply voltage

7	18-36 VDC galv. isolated
S	100-240 VAC

Operation

1	keys at the front
E	connection for external keypad

Switchingpoints

2	2 switchingpoints

Version

A	A

Dimension

O	none
D	max. 3 digits

Option „analog out“ cannot be combined with option „interface“!

Contents

Contents

1. Brief description

The panel meter **IMG-AU** is a 4-digit digital indicator for measuring of diverse measuring signals like voltage/current, temperature and frequency. The configuration happens via 3 front keys or via the optional PC-software PM-TOOL. An integrated programming interlock prevents unrequested changes of the parameter and can be released again via an individual code.

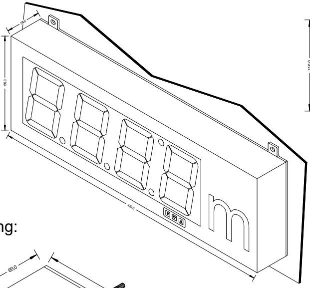
By the use of the 2 integrated normally open contacts threshold values can be monitored and reported to an superior master display. The electrical connection happens on the rear side via plug-in terminals.

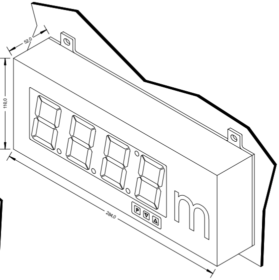
Selectable functions like e.g. the request of the min/max-value, the tara-function, the average determination, the direct change of the threshold value in operating mode and additional measuring support points for linearisation of the measuring input complete the concept of a modern device.

2. Assembly

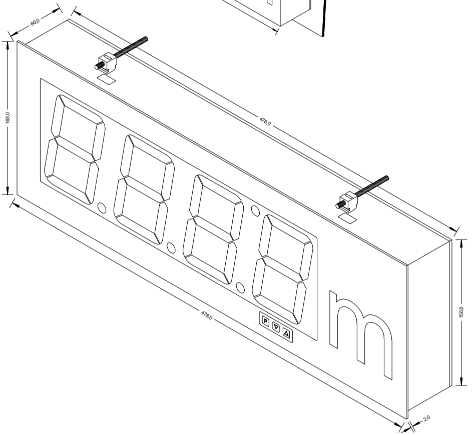
Please read the Safety advices on page 39 before installation and keep this user manual for future reference.

Built-on housing:





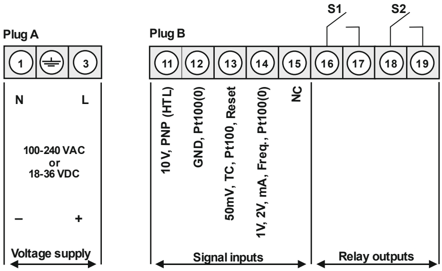
Installation housing:



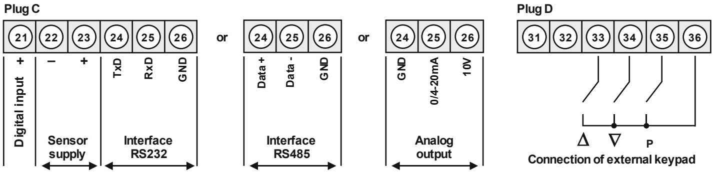
3. Electrical connection

3.1. Connector pin assignment

Type **IMG-AUR41.000X.S12AO**	57 mm	Supply 100-240 VAC
Type **IMG-AUR41.000X.712AO**	57 mm	Supply 18-36 VDC
Type **IMG-AUR42.000X.S12AO**	100 mm	Supply 100-240 VAC
Type **IMG-AUR42.000X.712AO**	100 mm	Supply 18-36 VDC



Options:

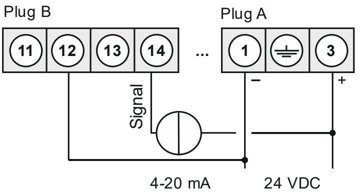


3.2. Connection examples

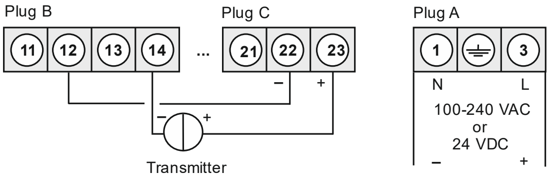
Below please find some connection examples, which demonstrate some practical applications:

3.2.1. Current / Voltage

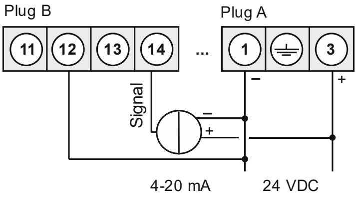
2-wire sensor 4-20 mA



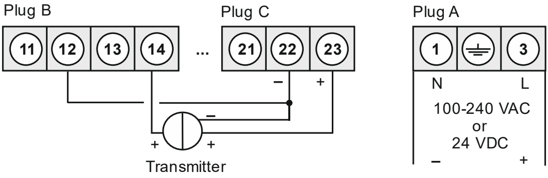
2-wire sensor 4-20 mA with 24 VDC sensor supply



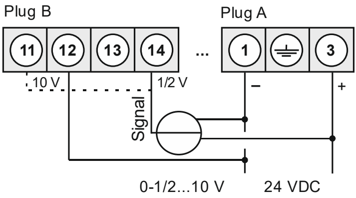
3-wire sensor 0/4-20 mA



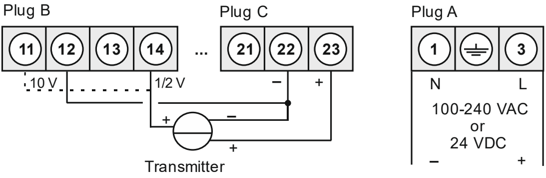
3-wire sensor 0/4-20 mA with 24 VDC sensor supply



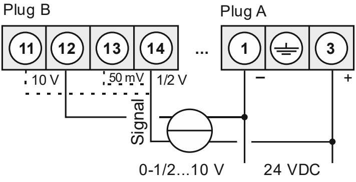
3-wire sensor 0-1/2…10 V



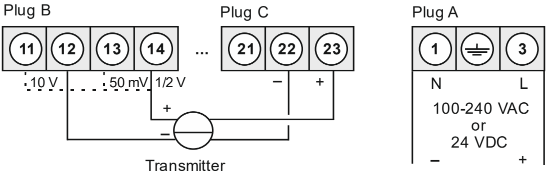
3-wire sensor 0-1/2…10V with 24 VDC sensor supply



4-wire sensor 0-1/2…10 V, 50 mV

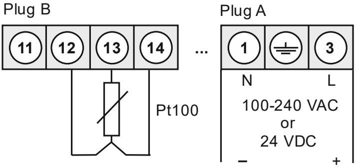


4-wire sensor 0-1/2…10 V, 50 mV with 24 VDC sensor supply

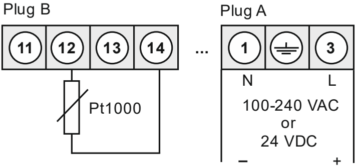


3.2.2. Temperature

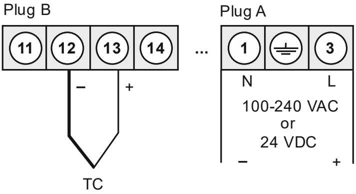
Pt100 3-wire



Pt1000 2-wire

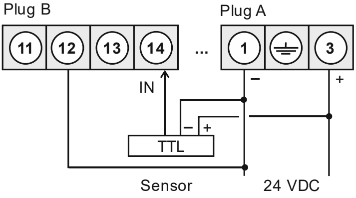


Thermocouple

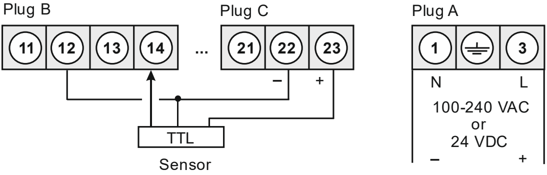


3.2.3. Frequency / Rotational speed

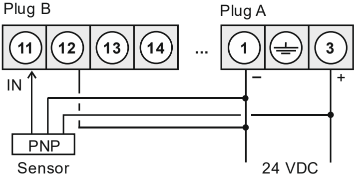
Sensor with TTL-output



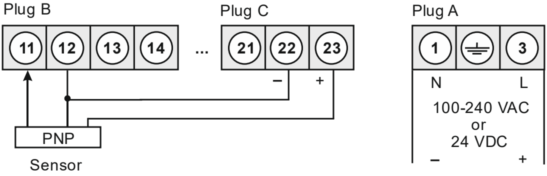
Sensor with TTL-output and 24 VDC sensor supply



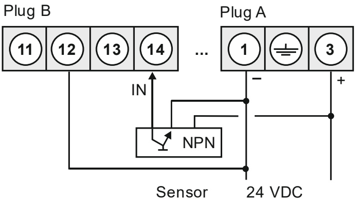
Sensor with PPN-output



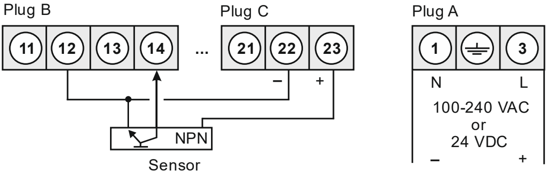
Sensor with PNP-output and 24 VDC sensor supply



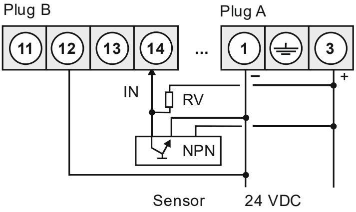
Sensor with NPN-output



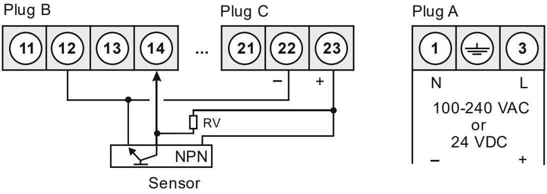
Sensor with NPN-output and 24 VDC sensor supply



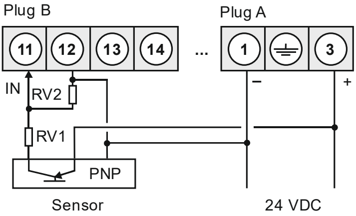
Sensor with NPN-output and necessary resistance



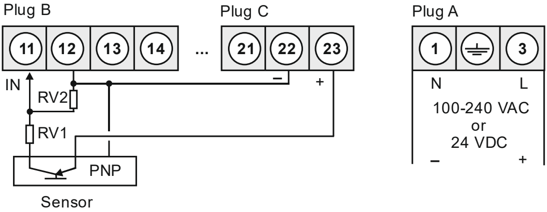
Sensor with NPN-output, necessary ext. resistance and 24 VDC sensor supply



Sensor with PNP-output and external resistance wiring



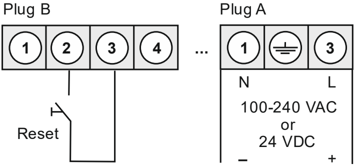
Sensor with NPN-output, necessary ext. resistance and 24 VDC sensor supply



3.2.4. Counter

If the device is used as counter, please use the connection examples for frequency / rotational speed and follow the examples given below for a performed reset input:

Manual setting back via external feeler



4. Description of function and operation

4.1. Operating and display elements

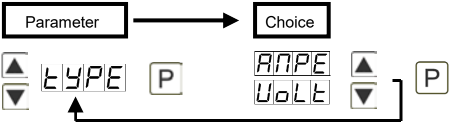
The device comes with 3 keys, with which you can parameterize the device and retrieve stored functions during operation. Functions, that can be adjusted or changed are always signalised by a flashing of the display. Adjustments that were made in the „Parameterisation level“ are always confirmed with **[P]** and thus saved. The device saves however automatically all adjustments and changes back into operating mode, if no more key actuation takes place within 10 seconds.

Key symbol	Function in operating mode	Function at parameterisation
Program key **[P]**	Change the parameterisation with program key **[P]**.	Change into a lower parameterization level or to deposited values.
Minus key **[▼]**	Depending on adjusted key functions, use the minus key **[▼]** for calling up the minimum value or changing a lower limit value.	Change between parameter and changing of parameter within the value level.
Plus key **[▲]**	Depending on adjusted key functions, use the plus key **[▲]** for calling up the maximum value or changing a lower limit value.	Change between parameter and changing of parameter within the value level.

A switched-on relay or an activated switching point will be reported optically by a flashing of the respective switching point LED next to the 7-segment display. A display over-/underflow is displayed by 4 bars „- - - -„ / „¯¯¯¯„.

Achieve a quicker parameterisation break-off by pushing the navigation keys **[▲]** and **[▼]** simultaneously.

Example: Setting up the device parameter, e.g. selection of the input signal



Example: Setting up numerical values, e.g. final value of measuring range

Numerical values are adjusted from the smallest to the highest digit with **[▲] [▼]** and confirmed digit per digit with **[P]**. A minus sign can only be adjusted on the leftmost digit. After the last digit, the display changes back into menu-level.

4.2. Programming via configuration software PM-TOOL MUSBG:

The software comes on CD incl. an USB-cable with a Micro-USB connector plug. The connection happens after opening the operating flap (rear side of the housing) via a Micro-USB connector plug and the PC is connected via an USB connector plug.

System requirements: **PC with USB-interface**
Software: **Windows XP, Windows VISTA**

With this tool the device configuration can be created, readout and saved on the PC. Via the easy to handle program surface the parameter can be changed, whereat the mode of operation and the possible selection options can be preset via the program.

CAUTION!
During parameterisation with a connected measuring signal, make sure that the measuring signal has no mass supply to the programming plug. The programming adapter is galvanically not isolated and directly connected with the PC. Via polarity of the input signal, a current can discharge via the adapter and destroy the device as well as other connected components!

5. Setting-up the device

5.1. Switching-on

Once the installation is complete, start the device by applying the voltage supply. Check beforehand once again that all the electrical connections are correct.

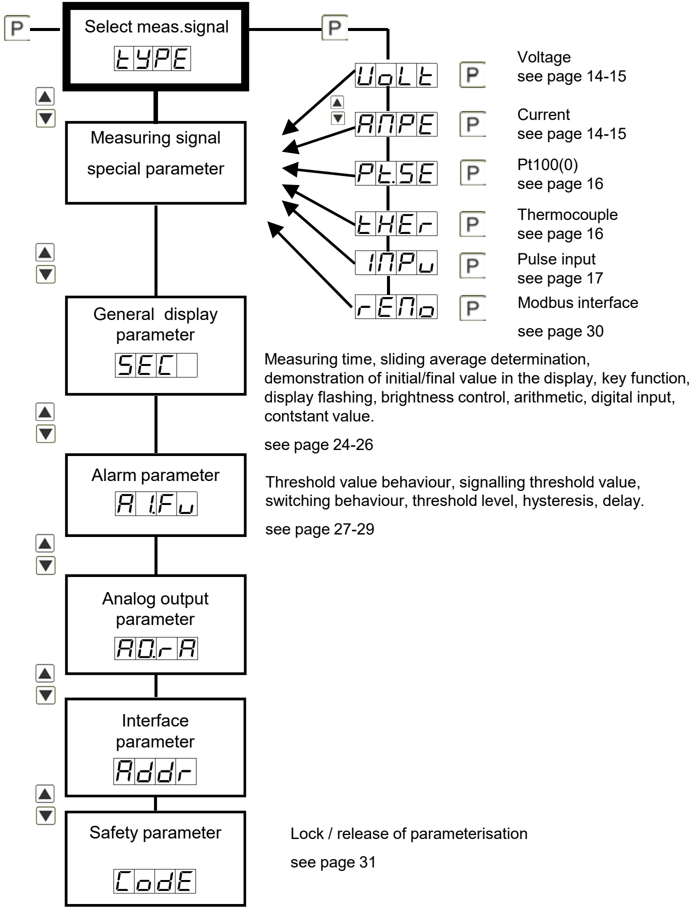
Starting sequence

For 1 second during the switching-on process, the segment test (8 8 8 8) is displayed, followed by an indication of the software type and, after that, also for 1 second, the software version. After the start-up sequence, the device switches to operating/display mode.

6. Parameterisation

6.1. Selection of the input signal: type

During the adjustment of the type, an allocation of the input version takes place. Selectable are 5 input types: Voltage, Current, Pt100(0), Thermocouple and Pulse signal.



6.1.1. Device parameter for the allocation of voltrage/current signals: VoLT, AMPE

VoLT: Selectable are 4 pre-calibrated voltage signals and 1 signal for direct calibration at the measuring section: **0-10 V**, **0-2 V**, **0-1 V**, **0-50 mV** and **0-10 VDC sensor signal**

AMPE: Selectable signals are: **0-20 mA** and **4-20 mA**

P | tYPE ▲▼ VoLt ▲▼ AMPE ▲▼ Pt.SE ▲▼ tHEr ▲▼ InPu ▲▼ P

Parameter		Menu item				Default
VoLt	VoLt	0-10	0-2	0-1	0-50	0-10
		SEn.U				
AMPE	AMPE	0-20	4-20	SEn.A		0-20

Parameter		Menu item				Default
End	End	-1999	to	9999		1000
OFFS	OFFS	-1999	to	9999		0
dot.A	dot.A	0	to	0.000		0
EndA	EndA	-19.99	to	99.99		10.0
OFFA	OFFA	-19.99	to	99.99		0.0
tArA	tArA	-1999	to	9999		0
SPC.A	SPC.A	0	to	9		0
dIS.1	dIS.1	-1999	to	9999		
InP.1	InP.1	-19.99	to	99.99		
dIS.2	dIS.2	-1999	to	9999		
InP.2	InP.2	-19.99	to	99.99		
dIS.3	dIS.3	-1999	to	9999		
InP.3	InP.3	-19.99	to	99.99		
dIS.4	dIS.4	-1999	to	9999		

Parameter		Menu item				Default
InP.4	I nP.4	-19.99	to	99.99		
diS.5	dI S.5	-1999	to	9999		
InP.5	I nP.5	-19.99	to	99.99		
dIS.6	dI S.6	-19.99	to	99.99		
InP.6	I nP.6	-1999	to	9999		
diS.7	dI S.7	-19.99	to	99.99		
InP.7	I nP.7	-1999	to	9999		
dIS.8	dI S.8	-19.99	to	99.99		
InP.8	I nP.8	-1999	to	9999		
diS.9	dI S.9	-19.99	to	99.99		
InP.9	I nP.9	-1999	to	9999		

End / OFFS: Upper range value/lower range value
By use of this pair of values, the desired display value can be allocated to the measuring signal.

dot.A: Comma / decimal place
Determine the decimal representation of the display value with the decimal point. It is used for the adjustment of the limit values, too.

EndA / OFFA: Rescale the measuring input values
With this function the final value/initial value can be rescaled to e.g. 19.5mA/3.2mA without application of the measuring signal.

tArA: Setting up the Tara value / Offset value
The preset value is added to the linearised value. So the characteristic line can be shifted by the selected amount.

SPC.A: Number of additional supporting points
To linearise nonlinear sensor values, 9 additional supporting points can be defined for the initial and final value. Only the activated supporting point parameters are shown.

dIS1…dIS9: Display values for supporting points
Under this parameter supporting points are defined on a value basis.

INP1…INP9: Analog values for supporting points
The supporting points are always preset according to the selected input signal ma/V. Here, desired analog values can be freely adjusted in ascending order.

6.1.2. Device parameter for the allocation of Pt100(0), Thermocouple: Pt.SE, THEr

Pt.SE: Selectable are 2 types:
Pt.Lo: Pt100 3-wire -50.0…200.0°C / -58.0…392.0°F
Pt.Hi: Pt100 3-wire -200…850°C / -328…1562°F
Pt.tH: Pt1000 2-wire -200…850°C / -328…1562°F

tHEr: Select between: **Thermocouple types L, J, K, B, S, N, E, T, R**

Parameter		Menu item					Default
Pt.SE	Pt.SE	Pt.Lo	Pt.Hi	Pt.tH			Pt.Lo

Parameter		Menu item					Default
tHEr	tHEr	tYP.L	tYP.J	tYP.H	tYP.b		tYP.L
		tYP.S	tYP.n	tYP.E	tYP.t		
		tYP.r					

Parameter		Menu item					Default
UnIt	Un It	°C	°F				°C
OFFS	OFFS	- 19.9	to	19.9			
		-35.9	to	35.9			000.0

UnIt: Type of temperature measurement.
Select, if the temperature shall be displayed in °C or °F with UnIt.

OFFS: Impedance matching.
The value alignment at a temperature measuring in °C can be adjusted between -20,0 and +20,0 and for a measurement in °F between -36 and +36. If the measuring type is changed later, the value will be rounded.

General device parameter see page 24
Alarm parameter see page 27
Safety parameter for lock / release of the parameterisation see page 31

6.1.3. Device parameter for the allocation of pulse signals: IMPU

FrEq: Frequency measurement of TTL-signals, PNP-/NPN-sensors.
tUrn: Rotational speed measurement (simplified adjustment possibility) of TTL-signals, PNP-/NPN-sensors. This function can also be used to scale a flow..
CO.up: Counting input (counting upwards) for TTL-signals, PNP-/NPN-sensors.
CO.on: Counting input (counting downwards) for TTL-signals, PNP-/NPN-sensors.

6.1.3.1. Frequency measurement

P | tYPE ▲▼ | VoLt ▲▼ | AMPE ▲▼ | Pt.SE ▲▼ | tHEr ▲▼ | IMPu ▲▼ | P

Parameter		Menu item				Default
IMPu	IMPu	FrEq				

Parameter		Menu item				Default
I.tYP	I.tYP	ttL	nPn	PnP	nAM	ttL
rAnG	rAnG	9.999	99.99	999.9	9999	9999
FILt	FILt	no	2	5	10	no
		20	50	100	200	
		500				
End	End	-1999	to	9999		1000
OFFS	OFFS	-1999	to	9999		0
dot.F	dot.F	0	to	0.000		0
End.F	End.F	0	to	9999		1000
OFF.F	OFF.F	0	to	9999		0
tArA	tArA	-1999	to	9999		0
SPC.F	SPC.F	0	to	9		0
dIS.1	dIS.1	-1999	to	9999		
InP.1	InP.1	0	to	9999		

Parameter		Menu item				Default
dIS.2	dI S.2	-1999	to	9999		
InP.2	I nP.2	0	to	9999		
dIS.3	dI S.3	-1999	to	9999		
InP.3	I nP.3	0	to	9999		
diS.4	dI S.4	-1999	to	9999		
InP.4	I nP.4	0	to	9999		
diS.5	dI S.5	-1999	to	9999		
InP.5	I nP.5	0	to	9999		
dIS.6	dI S.6	-19.99	to	9999		
InP.6	I nP.6	0	to	9999		
diS.7	dI S.7	-19.99	to	9999		
InP.7	I nP.7	0	to	9999		
dIS.8	dI S.8	-19.99	to	9999		
InP.8	I nP.8	0	to	9999		
diS.9	dI S.9	-19.99	to	9999		
InP.9	I nP.9	0	to	9999		

I.tYP: Pulse signal

4 different modes are available for the triggering of the pulse input:

ttL	Active TTL-signals with approx. 0.8 V lower and approx. 2 V upper threshold.
nPn	Passive switch contact, which operates the internal pull-up depending on the rate.
PnP	Active sensor output. A pulldown is operated in the display.
nAM	Namur input

rAnG: Selection of the frequency range

Selectable are 4 different frequency ranges:

9.999	0…9,999 Hz (automatic software filter to 100 Hz/5ms)
99.99	0…99,99 Hz (automatic software filter to 500 Hz/5ms)
999.9	0…999,9 Hz
9999	0…9999 Hz (almost 10 kHz)

FILt: Limitation of the pulse length

For contact bounce suppression of mechanical contacts via selection of the filter frequency.

no	No particular evaluation of the pulse length.
2	2 Hz with pulse-duty factor 1:1 => minimal pulse length 250 ms
5	5 Hz with pulse-duty factor 1:1 => minimal pulse length 100 ms
10	10 Hz with pulse-duty factor 1:1 => minimal pulse length 50 ms
20	20 Hz with pulse-duty factor 1:1 => minimal pulse length 25 ms
50	50 Hz with pulse-duty factor 1:1 => minimal pulse length 10 ms
100	100 Hz with pulse-duty factor 1:1 => minimal pulse length 5 ms
500	500 Hz with pulse-duty factor 1:1 => minimal pulse length 1 ms

End / OFFS: Upper range value/lower range value
By use of this pair of values, the desired display value can be allocated to the measuring signal.

dot.F: Comma / Decimal point
The decimal presentation of the display value is determined with the decimal point. It is used for the adjustment of the limit values, too.

End.F / OFF.F: Rescale pulse signals
Rescale the input frequency (**rAnGE**) without application of the pulse signal.

tArA: Setting of the Tara value / Offset value
The preset value is added to the linearised value. This way the characteristic line can be shifted by the selected amount.

SPC.F: Number of additional support points
To linearise nonlinear sensor values, 9 additional support points can be defined for the initial- and final value. Only the activated support point parameter are shown.

dIS1…dIS9: Display values for support points.
Under this parameter support points are defined on a value basis.

INP1…INP9: Analog values for support points.
The support points are always preset according to the selected input signal ma/V. Here, desired analog values can be freely adjusted in ascending order.

6.1.3.2. Rotational speed measuring

As more than 80% of the frequency measurement applications are referring to a rotational speed, there is a simplified adjustment mode available via type „**turn**“. A flow rate can be scaled with this function, too.

P tYPE ▲▼ UoLt ▲▼ AMPE ▲▼ Pt.SE ▲▼ tHEr ▲▼ IMPu ▲▼ P

Parameter		Menu item				Default
IMPu	IMPu	turn				

Parameter		Menu item				Default
I.tYP	I.tYP	ttL	nPn	PnP	nAM	ttL
FILt	FILt	no	2	5	10	no
		20	50	100	200	
		500				
PPt	PPt	0001	**to**	9999		0001
tIME	tIME	SEC	MIn	hour		MIn
dot	dot	0	**to**	0.000		0

I.tYP: Pulse signal

Available are 3 different modes for the triggering of the pulse input:

ttL	Active TTL-signals with approx. 0.8 V lower and approx. 2 V upper threshold.
nPn	Passive switching contact, which operates the internal pull-up depending on the rate.
PnP	Active sensor output. A Pulldown is operated in the display.
nAM	Namur input

FILt: Limitation of the pulse length
For contact bounce suppression of mechanical contacts via selection of the filter frequency:

no	No particular evaluation of the pulse length.
2	2 Hz with pulse-duty factor 1:1 => minimal pulse length 250 ms
5	5 Hz with pulse-duty factor 1:1 => minimal pulse length 100 ms
10	10 Hz with pulse-duty factor 1:1 => minimal pulse length 50 ms
20	20 Hz with pulse-duty factor 1:1 => minimal pulse length 25 ms
50	50 Hz with pulse-duty factor 1:1 => minimal pulse length 10 ms
100	100 Hz with pulse-duty factor 1:1 => minimal pulse length 5 ms
200	200 Hz with pulse-duty factor 1:1 => minimal pulse length 2.5 ms
500	500 Hz with pulse-duty factor 1:1 => minimal pulse length 1 ms

PPt: Pulse per rotation
With this parameter the number of pulse per rotation can be entered directly. It generally works with sprockets and their number of sprockets, incremental encoder and their resolution or glands with a number of boreholes. For simple flow meter with impeller it is only neccessary to enter the number of pulse per liter or cubic metre.

tIME: Time base
In general the time base for rotational speed is always set on „**MIn**“, it can of course be changed into seconds or hours.

dot: Comma / Decimal point
Determine the decimal representation of the display value with the decimal point. A rotation speed with up to 3 positions after decimal point can be displayed, if they are small enough.

Example: Rotation speed measuring
The rotation speed of a roller in a steel works needs to be displayed in turns/minute with one position after decimal place. The rotational speed will be recorded via a perforated disc with 18 holes, positioned in an angle of 20°. The maximum rotation speed of the roller is 60 turns/minute. Like this, adjust for example **FILt = 100; PPt = 18; tIME = MIn; dot = 0.0**. The difficulty with the adjustment of the filter is to calculate the pulse length precisely.

6.1.3.3. Upwards/downwards counter

P → tYPE ▲▼ UoLt ▲▼ AMPE ▲▼ Pt.SE ▲▼ tHEr ▲▼ IMPu ▲▼ P

Parameter		Menu item				Default
IMPu	IMPu	Co.uP	Co.dn			

Parameter		Menu item				Default
I.tYP	I.tYP	ttL	nPn	PnP	nAM	ttL
Co.bA	Co.bA	PuLS	SEC	Min		PuLS
EdGE	EdGE	PoSI	nEGA			PoSI
PrES	PrES	0001	to	9999		0001
FILt	FILt	no	2	5	10	no
		20	50	100	200	
		500				
End	End	-1999	to	9999		1000
End.C	End.C	0001	to	9999		1000
rSt	rSt	0	to	9999		0
dot	dot	0	to	0.000		0

I.tYP: Pulse signal
There a 3 modes for the triggering of the pulse input:

ttL	Active TTL-signals with approx. 0.8 V lower and approx. 2 V upper threshold.
nPn	Passive switching contact, which operates the internal pull-up depending on the rate.
PnP	Active sensor output. Operated a pulldown in the device.

Co.bA: Counter base
As standard the device records incoming pulses during counter operation. However the counter basis can also be used as system time in seconds or minutes. In doing so the pulse input turns into gate time, it counts at wing **PoSI** (**HIGH**-signal) and stands at **LOW**. The logic is contrary at wing **nEGA**.

EdGE: Counting start / counting end (wing)
The active wing declares when the counting takes place. The pulse recording **PuLS** is choosen as counter basis, via this it will be declared if the internal counter will be increased by the positive wing **PoSI** or the negative wing **nEGA**. If time is taken as time basis, then the active-triggering/**HIGH**-triggering will be selected with **PoSI** and the passive triggering/**LOW**-triggering will be selected with **nEGA**. The counter reset is always statical.

PrES: Prescaler
A prescaling in the device happens via the prescaler, so even large pulse numbers like e.g. 5.000.000 can be recorded by the device. Only the prescaled value will be included for the scaling.

FILt: Limitation of the pulse length
For contact bounce suppression of mechanical contacts via selection of the filter frequency:

no	No particular evaluation of the pulse length.
2	2 Hz with pulse-duty factor 1:1 => minimal pulse length 250 ms
5	5 Hz with pulse-duty factor 1:1 => minimal pulse length 100 ms
10	10 Hz with pulse-duty factor 1:1 => minimal pulse length 50 ms
20	20 Hz with pulse-duty factor 1:1 => minimal pulse length 25 ms
50	50 Hz with pulse-duty factor 1:1 => minimal pulse length 10 ms
100	100 Hz with pulse-duty factor 1:1 => minimal pulse length 5 ms
200	200 Hz with pulse-duty factor 1:1 => minimal pulse length 2.5 ms
500	500 Hz with pulse-duty factor 1:1 => minimal pulse length 1 ms

End, End.C: Display terminal value and pulse terminal value
The display value can be freely linearised via the prescaled pulse number. For this purpose, the number of desired pulses is assigned to a display value. The zero-point cannot be prescaled. At a backwards counter **End** and **End.C** serve as start value. For the absolute counter threshold values, the adjustments of **dI.HI** and **dI.Lo** are used. By reaching them, all digits that reached this value are flashing, what equates an underflow/overflow.

rSt: Reset value
If **rSt = 0** is adjusted, then the initial value is reset during a reset contact. If the value is not equal to zero, the display value and the number of entered pulses are changed. The value change takes place in the opposite direction to the preset direction of rotation.

dot: Comma / Decimalstelle
The decimal point defines the decimal place of the display value.

General device parameter see page 24
Alarm parameter see page 27
Safety parameter for lock / release of parameterisation see page 31

6.2. General device parameter

Parameter		Menu item					Default
SEC	SEC	0.01	to	2.0			1.0
GLM	GLM	1	to	20			1
OVEr	OVEr	no	AOC	rAnG	SPr		no
		IOPr					
dI.Lo	dI.Lo	-1999	to	9999			-1999
dI.HI	dI.HI	-1999	to	9999			9999
ZErO	ZErO	0	to	99			0
ArLt	ArLt	no	rAdI	SquA	rE2P		no
ConS	ConS	-1999	to	9999			0
dot.C	dot.C	0.000	to	0			0
tASt	tASt	no	EHtr	AL.LI			no
dIG.I	dIG.I	no	tArA	HoLd	MUL.C		no
		dIu.C	dIF.C	AL.tr			
d.Mod	d.Mod	Actu	M.buS				
brt	brt	1	to	9			5
		Auto					

SEC: Measuring time
Setting the basic measuring time or the frequency filter to calm the measured value. This filter value is adjustable from 0.01…2.00 seconds.

GLM: Sliding averaging
Besides the measuring time, a sliding averaging of 1…20 values can be activated, too. Here, no seperate emphasis between the past values is taking place. At **GLM = 1** the sliding averaging is switched off.

OVEr: Overflow/Underflow behaviour
The overflow/underflow of the measuring input is displayed by 4 upper bars or 4 bars at the bottom. Exception is input type „**4-20**“ (mA), where a measuring value smaller than 1 mA can already be seen as underflow. This shall indicate a sensor failure.

no: no evaluation of the overflow

ADC: depends of **dI.Lo** and **dI.HI**

rAnG: depends of **OFFS** and **End**

5Pr: ± 5% of **OFFS** and **End**

10Pr: ± 10% of **OFFS** and **End**

dI.Lo, dI.HI: Presentation of initial value/end value in the display
For overflow evaluation the measuring range and the optional selected overflow (**OVEr**) behaviour are evaluated. In addition this range can be limited by the parameter **dI.HI** and **dI.Lo**.

ZErO: Zero point slowdown
At the zero point slowdown a range of value around zero can be preset, where the display shows a zero. If e.g. a 10 is displayed, a zero would be displayed in the range of -10 to +10, below continue with -11 and above with +11.

tASt: Allocation (deposit) of key functions
For operating mode either a min/max-value monitoring or a limit value correction on the navigation keys can be deposited here. If the min/max memory is activated by **EHtr**, the measured min/max-values will be saved during operation and can be recalled via the navigation keys **[▲] [▼]**. At restart of the device, all values are lost. If the limit value correction **AL.LI** is selected, limit values can be changed during operation, without interfere with the operating procedure. If no is adjusted, the navigation keys **[▲] [▼]** are without any function in the operating mode.

ArIt: Arithmetic function
- **no:** deactivated
- **rEZP:** reciprocal value
- **rADI:** root extraction
- **SquA:** squaring down
- **MuL.C:** multiplication with **ConS**
- **DIV.C:** division by **ConS**

ConS: Constant value
The value entered here can be used for the arithmetic or the digital input (optional).

dG.In: Digital input function

- **no:** no function
- **tArA**: taring of the display
- **HoLd:** hold the current measurand
- **MuL.C:** multiplication with constant value
- **dIv.C:** division by constant value
- **dIF.C:** difference with constant value
- **AL.tr:** trigger alarm (depends on **Ax.Fu**!)

brt: Brightness
The brightness of the display can be adjusted in 9 levels. The adjustment **Auto** is accessible only with an optional brightness sensor.

FLAS: Display flashing at threshold value exceedance/undercut
A display flashing can be added as additional alarm function either to the first limit value (select: **AL-1**), to the second limit value (select: **AL-2**) or to both limit values (select: **AL-12**). With **no** (factory settings), no flashing is allocated.

6.3. Alarm parameter

Parameter		Menu item					Default
AI.Fu	A 1.Fu	oFF	on	H 1.L 1	Lo.L 1		
		rAnG	Out.r	d. InP	M.buS		oFF
AI.Er	A 1.Er	no	oFF	on			oFF
AI.LI	A 1.L 1	-1999	to	9999			100
AI.HY	A 1.HY	0000	to	9999			0
AI.HI	A 1.H 1	-1999	to	9999			200
AI.Lo	A 1.Lo	-1999	to	9999			100
AI.oF	A 1.oF	0000	to	5999			0
AI.on	A 1.on	0000	to	5999			0
AI.FL	A 1.FL	on	oFF				oFF
A2.Fu	A2.Fu	oFF	on	H 1.L 1	Lo.L 1		
		rAnG	Out.r	d. InP	M.buS		oFF
A2.Er	A2.Er	no	oFF	on			oFF
A2.LI	A2.L 1	-1999	to	9999			300
A2.HY	A2.HY	0000	to	9999			0
A2.HI	A2.H 1	-1999	to	9999			400
A2.Lo	A2.Lo	-1999	to	9999			300
A2.oF	A2.oF	0000	to	9999			0
A2.on	A2.on	0000	to	9999			0
A2.FL	A2.FL	on	oFF				oFF

A1.Fu, A2.Fu: Threshold value behaviour

The functional principle allows switching between different operating modes of the switching outputs. If **Ax.Fu = oFF** is selected, the corresponding switching point parameters are not displayed.

oFF	The switching point is without function and corresponding parameters are not displayed. (Default state).
On	The switching point is activated in measuring mode and associated parameters except **Ax.Er** and **Ax.tY** are not displayed.
HI-LI	Switch at threshold value exceedance.
Lo.LI	Switch at threshold value undercut.
rAnG	Switch inside the specified range.
Out.r	Switch outside the specified range.
d.InP	Pending high-signal activates the alarm.
M.buS	Alarm can be controlled via Modbus.

A1.Er, A2.Er: Alarm at threshold value errors

If a device check sum is not correct or the display range is violated, the behavior of the switching points can be preset.

on	Activates the selected switching points behaviour. **HIGH/L+** is switched in Push-Pull-operation.
oFF	The switching points behave contrary. The error behavior overwrites the actual limit value function in case of an error.
no	An error has no defined influences. This means a value of 10,000 for the overflow evaluation and a value of -2,000 for the underflow evaluation.

A1.L1, A2.L1: Switching threshold

The switching threshold is specified here, from which an alarm responds or is activated / deactivated. This parameter is not queried for the window function of a switching point.

A1.HY, A2.HY: Hysteresis

The hysteresis defines a difference to the limit value by which an alarm reacts delayed. This parameter is not queried for the window function of a switching point.

A1.HI, A2.HI: Upper limit value

A1.Lo, A2.Lo: Lower limit value

For the area functions **A1.FU**, **A2.FU = rAnG or Out.r**, this value defines the upper / lower limit of the window function between "-1999 ... 9999". This parameter is not displayed for other functional principles. The functional principle can change between switching points 1 and 2.

A1.oF, A2.oF: Delayed release
Here a delayed switch-off from 0-5999 seconds can be preset for the limit values. The time value is not stored permanently and is reset by a device start. Furthermore, the alarm status is determined directly during the device start without taking into account the set delay.

A1.on, A2.on: On-delay
Here a delayed switch on from 0-5999 seconds can be preset for the limit values. The time value is not stored permanently and is reset by a device start. Furthermore, the alarm status is determined directly during the device start without taking into account the set delay.

A1.FL, A2.FL: Display flashing
Display flashing at active alarm.

6.4. Analog output

Parameter		Menu item					Default
AO.In	AO. In	Act.U	Min.U	MAX.U	AVG.U		Act.U
AO.rA	AO.rA	0-10	0-20	4-20			0-10
AO.En	AO.En	-1999	9999				1000
AO.OF	AO.OF	-1999	9999				0
AO.OV	AO.OV	dEF	End	OFF	Min		dEF
		MAX					

AO.In: The analog output signal always follows the display and can refer to the following functions:

- **Act.U:** current measurand
- **Min.U:** minimum value
- **MAX.U:** maximum value
- **AVG.U:** sliding average

AO.rA: Select the output signal
By use of this parameter one can select between the following output signals: 0-20 mA, 4-20 mA or 0-10 VDC.

AO.En: End value of analog output -1999…9999
A measuring range end value is assigned to the analog output 0/4-20 mA or 0-10 VDC.

AO.OF: Initial value of analog output -1999…9999
A measuring range initial value is assigned to the analog output 0/4-20 mA or 0-10 VDC.

AO.ov: Overflow behaviour
In order to detect and evaluate faulty signals, e.g. by means of a control, the overflow behavior of the analog output can be defined as follows:

- **dEF:** The analog output runs to the set limit, e.g. 4 and 20 mA.
- **End:** The analog output switches to the end value e.g. 20 mA.
- **OFF:** The analog output switches to the initial value e.g. 4 mA.
- **MIn:** The analog output switches to the smallest possible output value.
- **MAX:** The analog output switches to the highest possible output value. The value can also be greater than 20 mA or 10 V.

6.5. Interface

The parameters of the interfaces RS232, RS485 and Bluetooth correspond to:

- 9600 Baud
- 8 data bits
- 1 stopbit
- no parity

Parameter		Menu item				Default
Addr	Addr	1	250			1
ModE	ModE	ASCII	rtu			ASCII
t.out	t.out	0	100			0
PIn	PIn	0000	9999			0

Addr: Modbus address
Device address under which the device can be reached in the communication bus.

ModE: Modbus mode
ASCII: Only in this mode the communication with the PM-TOOL-MUSG is possible.
RTU: Remote Terminal Unit, here the data are transmitted in binary form.

t.out: Modbus timeout
If a value greater than 9 is set, an internal timer is reset to the set value for each communication. If the timer runs to zero, a timeout error is generated. This leads to an error-bit which can be output via a register or passed on to an alarm.

PIn: Safety code for Bluetooth
This code is necessary for the communication with the PM-TOOL-MUSG. This parameter can be used to deny access to the data. If the value is 0, the data can be interrogated without a pin.

6.6. Safety parameter for blocking / releasing the parameterization

Parameter		Menu item				Default
CodE	CodE	0000	**to**	9999		1234
run	run	ULOC	LOC			ULOC

CodE: Assignment of an individual numerical code (4-digit number combination, which is freely assignable)
If this code is assigned (0000 factory setting), all parameters are locked to the operator, if **LOC** is then selected under menu item **run**. By pressing **[P]** in the operating mode for approx. 3 seconds, the message **CodE** appears in the display. The code needs be entered before each parameterization attempt until the programming is enabled again with **ULoC** under **run**.

run: Activation / Deactivation of the programming lock
Use the navigation keys **[▲] [▼]** to select between deactivated key interlock **ULOC** (factory setting) and activated key lock **LOC**. If **LOC** is selected, the keyboard is locked. To enter the menu level again, press **[P]** in the operating mode for 3 seconds. The now appearing **CodE** (factory setting 0000) is entered with **[▲] [▼]** & **[P]** and unlocks the keyboard. An incorrect entry is displayed with **FAIL**.
In **LOC** mode, the display can not be reset, which should ensure a regular operation.

7. Modbus protocol

The device communicates always via the MODBUS protocol with the PC. This does not depend on the fact, if a RS232/RS495 interface is available or not. Devices without RS232/RS485 interface, carry out the transmission via the configuration interface.

The Byte protocol is determined to:

1 Start bit, 8 Data bits, 1 Stopp bit, no parity with a fix Baud rate of 9600 Baud.

Devices without RS232/RS485-interface do not have a direct access to MODBUS parameter, in this case use the USB-interface for configuration via the PM-TOOL. These parameters can still be adapted via the bus.

Compatibility – The interface is compatible to the MODBUS protocol of „Modicon“. This means that all register have a size of 16-Bit. Larger data types are then placed consecutively through several registers. A non-Modicon-compatible-mode is supported, too. In this mode, each data type occupies only one register corresponding to the data type size. (The minimium is always 16-Bit).

Advice: Access to data types that occupy multiple registers must always be done in a read / write access and must not be distributed to multiple read / write accesses!

Device address – A value between 1 and 247 can be used as device address. At address 0 you can reach several devices simultaneously (broadcast), if the corresponding function is supported.

Transfer mode – The devices support the RTU-mode (binary data) and the ASCII-mode (alphanumeric signs - hexadecimal, default). The RTU-mode is faster, as less bytes need to be transferred, but more time-critical. The ASCII mode is better at communicating with PC-based systems, as they often can not meet the time-critical conditions for the RTU mode.

Attention: If the mode is set to RTU, communication with the PM-TOOL is no longer possible. This can only be used in ASCII mode.

Name	Range of values	Memory size	Number of register in modicon-compatible Bus	Number of register in non-modicon-compatible Bus
INT08	-128…127	2 Byte	1	1
UINT08	0…255	2 Byte	1	1
INT16	-32768…32767	2 Byte	1	1
UINT16	0…65535	2 Byte	1	1
INT32	-2147843648… 2147843674	4 Byte	2	1
UINT32	0…4294967295	4 Byte	2	1
INT64	-9223372036854775808 … 9223372036854775807	8 Byte	4	1
FLOAT	-/+3.402823466 e-/+38	4 Byte	2	1

Modbus ASCII

Start	Device address	Function	Data	CRC-value	End
Sign " : "	2 signs	2 signs	nx2 signs	2 signs	2 signs "/r/n"

Modbus-RTU (Holding time > 4 ms between the frames)

Device address	Function	Data	CRC-value
1 Byte	1 Byte	n Bytes	2 Bytes

Supported function codes

Code	Function	Comment
0x03	READ HOLDING REGISTER	e.g. measuring values and alarm status
0x04	READ INPUT REGISTER	same function as code 0x03
0x08	DIGANOSTIC	device diagnosis
0x10	WRITE MULTIPLE REGISTER	e.g. measuring values and alarm status transferred to device

Modbus-index

<table>
<tr><th>Name</th><th>Index</th><th>Access mode</th><th>Min/Max-value
Data type</th><th colspan="2">Comment</th></tr>
<tr><td>Device number</td><td>0x4400
/17408</td><td>read/
write</td><td>0…65535
UINT16</td><td colspan="2">User-defined identification</td></tr>
<tr><td rowspan="3">Relay 1 active</td><td rowspan="3">0x4500
/17664</td><td rowspan="3">read</td><td rowspan="3">0/1
UINT16</td><th>Value</th><th>Function</th></tr>
<tr><td>0</td><td>Inactive</td></tr>
<tr><td>1</td><td>Active</td></tr>
<tr><td rowspan="3">Relay 2 active</td><td rowspan="3">0x4501
/17665</td><td rowspan="3">read</td><td rowspan="3">0/1
UINT16</td><th>Value</th><th>Function</th></tr>
<tr><td>0</td><td>Inactive</td></tr>
<tr><td>1</td><td>Active</td></tr>
<tr><td rowspan="3">Digital input</td><td rowspan="3">0x4510
/17680</td><td rowspan="3">write</td><td rowspan="3">0/1
UINT16</td><th>Value</th><th>Function</th></tr>
<tr><td>0</td><td>Inactive</td></tr>
<tr><td>1</td><td>Active</td></tr>
</table>

<table>
<tr><th>Name</th><th>Index</th><th>Access mode</th><th>Min/Max-value
Data type</th><th colspan="2">Comment</th></tr>
<tr><td>Alarm status</td><td>0x4520
/17696</td><td>read/
write</td><td>UINT16</td><td colspan="2">Bit0…Bit2 correspond to alarm 1…2
(write: only, if the corresponding alarm is set on bUS)</td></tr>
<tr><td rowspan="5">Display brightness</td><td rowspan="5">0x4680
/18048</td><td rowspan="5">read/
write</td><td rowspan="5">0…10
UNIT16</td><th>Value</th><th>Function</th></tr>
<tr><td>0</td><td>Automatic brightness</td></tr>
<tr><td>1</td><td>Min. brightness</td></tr>
<tr><td>…</td><td></td></tr>
<tr><td>9</td><td>Max. brightness</td></tr>
<tr><td>Measurand LOW-WORD</td><td>0x6000
/24576</td><td rowspan="2">read/
write</td><td rowspan="2">-1999…9999
INT32</td><td colspan="2" rowspan="2">Measurand input
(write: only at d.MoD = M.buS)</td></tr>
<tr><td>Measurand HIGH-WORD</td><td>0x6001
/24577</td></tr>
<tr><td rowspan="5">Decimal point</td><td rowspan="5">0x6002
/24578</td><td rowspan="5">read/
write</td><td rowspan="5">0…3
UINT16</td><th>Value</th><th>Function</th></tr>
<tr><td>0</td><td>0</td></tr>
<tr><td>1</td><td>0,0</td></tr>
<tr><td>2</td><td>0,00</td></tr>
<tr><td>3</td><td>0,000</td></tr>
<tr><td>Binary value LOW-WORD</td><td>0x6100
/24832</td><td rowspan="2">read</td><td rowspan="2">INT32</td><td colspan="2" rowspan="2">Internal measurand</td></tr>
<tr><td>Binary value HIGH-WORD</td><td>0x6101
/24833</td></tr>
<tr><td>Alarm limit 1</td><td>0x6500
/25856</td><td>read/
write</td><td>-1999…9999
INT16</td><td colspan="2"></td></tr>
<tr><td>Alarm limit 2</td><td>0x6501
/25857</td><td>read/
write</td><td>-1999…9999
INT16</td><td colspan="2"></td></tr>
<tr><td>Measurand LOW-WORD</td><td>0x7000
/28672</td><td rowspan="2">read/
write</td><td rowspan="2">-1999…9999
FLOAT</td><td colspan="2" rowspan="2">Current scaled measurand
(write: only at d.Mod = M.buS)</td></tr>
<tr><td>Measurand HIGH-WORD</td><td>0x7001
/28673</td></tr>
</table>

Measurand and binary value are designed as a 32-bit value and must be transmitted in 2x 16-bit parts as word. The byte sequence within the word is first HIGH-byte and then LOW-byte.

For the display value to be written via Modbus, **d.Mod = M.buS** must be set.

For direct control of the alarms via the bus, the respective Ax-function must be set to **M.buS**. Each alarm status can be changed or read out via the corresponding bit. Bit 0 corresponds to alarm 1 ... Bit 2 corresponds to alarm 2.

Advice:

When reading the process values as a float, the decimal point configured in the device is used. The decimal point parameterized in the device is also returned when reading the decimal point.

When writing the process value, the decimal point sent via Modbus is used. Both for display on the display and for converting the sent float value.

All parameters changed via Modbus are not stored permanently.

After a restart these values are lost.

8. Reset to default values (factory setting)

In order to put the device into a defined basic state, it is possible to perform a reset to the default values. The following procedure should be used for this:
Switch off the power supply of the device. Press the **[P]** key and reconnect the power supply while holding down the **[P]** key. Press the **[P]** key until "----" appears in the display. By resetting the default values are loaded and used for further operation. The device is now set back to the delivery state.

ATTENTION! All application-specific data are lost!

9. Technical data

Housing	
Built-on housing	57 mm device: 248 x 110 x 52 mm (BxHxD)
	100 mm device: 470 x 155 x 58 mm (BxHxD)
Installation housing	57 mm device
	100 mm device: 478 mm x 155 mm x 60 mm (BxHxD) $474^{-0.5}$ mm x $159^{-0.5}$ mm (BxH) = Panel cutout
Material	Aluminium, black, powder-coated
Protection class	IP65 completely
Connection (intern. plug) Plug A: Plug B: Plug C: Plug D:	PG-screwing, underside of the housing 3-pole plug-in terminal for voltage supply 9-pole plug-in terminal for measuring signal and switching outputs 6-pole plug-in terminal for analog output, sensor supply, digital input, interface (optional) 6-pole plug-in terminal for external keypad (optional)
Weight	57 mm device (4-digit): approx. 1.3 kg 100 mm device (4-digit): approx. 2.7 kg
Display	
Display	Power LEDs
Digit height	57 mm, 100 mm
Segment colours	red, green (optional)
Number of digits	4, optional 6 or 8 digits
Display range	-1999 to 9999
Overflow	horizontal bars at the top
Underflow	horizontal bars at the bottom
Display time	0.01 to 2.0 seconds
Application area	Inside / Interior zone

Measuring input

Signal	**Measuring range**	**Measuring span**	**Resolution**	**Internal resistance**
Voltage	0…10 V	0…12 V	≥ 14 bit	Ri > 100 kΩ
Voltage	0…2 V	0…2,2 V	≥ 14 bit	Ri ≥ 10 kΩ
Voltage	0…1 V	0…1,1 V	≥ 14 bit	Ri ≥ 10 kΩ
Voltage	0…50 mV	0…75 mV		Ri ≥ 10 kΩ
Current	4…20 mA	1…22 mA		Ri = ~125 Ω
Current	0…20 mA	0…22 mA		Ri = ~125 Ω

Signal	Measuring range	Measuring range	Resolution
Pt100 3-wire	-50…200°C	-58…392°F	0.1°C / 0.1°F
Pt100 3-wire	-200…850°C	-328…1562°F	1°C / 1°F
Pt1000 2-wire	-200…850°C	-328…1562°F	1°C / 1°F
Thermo K	-270…1350°C	-454…2462°F	1°C / 1°F
Thermo S	-50…1750°C	-328…3182°F	1°C / 1°F
Thermo N	-270…1300°C	-454…2372°F	1°C / 1°F
Thermo J	-170…950°C	-274…1742°F	1°C / 1°F
Thermo T	-270…400°C	-454…752°F	1°C / 1°F
Thermo R	-50…1768°C	-58…3214°F	1°C / 1°F
Thermo B	80…1820°C	176…3308°F	1°C / 1°F
Thermo E	-270…1000°C	-454…1832°F	1°C / 1°F
Thermo L	-200…900°C	-328…1652°F	1°C / 1°F
Frequency	0…10 kHz	0…10 kHz	0.001 Hz
NPN	0…3 kHz	0…3 kHz	0.001 Hz
PNP	0…1 kHz	0…1 kHz	0.001 Hz
Rotational speed	0…9999 1/min	0…9999 1/min	0.001 1/min
Counter	0…9999 (prescaler until 1000)		

Impulse input	**TTL**	**HTL/PNP**	**NPN**	**Namur**
	Low <2 V, High >3 V	Low <6 V, High >8 V	Low <0.8 V, High via resistance	Low <1.5 mA, High >2.5 mA

Counter input	active <0.8 V
Digital input	> 2.4 V OFF, 10 V ON, max. 30 VDC, R_I ~ 5 kOhm
Output	
Sensor supply	10 VDC / 20 mA, incl. digital input 24 VDC / 50 mA, incl. digital input
Analog output	0/4-20 mA, burden 350 Ω, 0-10 VDC, burden 10 kΩ, 16 Bit
Relay	2x normally open contact 30 VDC / 2 A, resistive burden
Interface	RS232 Modbus protocol RS485 Modbus protocol Bluetooth module 4.0
Measuring error	
Standard	0.2% of measuring range ± 1 Digit
Pt100/Pt1000	0.5% of measuring range ± 1 Digit
Thermocouple	0.3% of measuring range ± 1 Digit

Accuracy	
Reference junction	± 1°C
Drift of temperature	100 ppm / K
Measuring time	0.01…2.0 seconds
Measuring rate	approx. 1/s with temperature sensor, approx. 100/s with standard signals
Measuring principle	U/F-conversion
Resolution	approx. 14 Bit at 1s measuring time
Power pack Supply Power consumption	 100-240 VAC 50/60 Hz, DC ±10% 18-36 VDC, galvanically isolated max. 50 VA
Storage	EEPROM
Data preservation	≥ 100 years at 25°C
Ambient conditions	
Working temperature	-20°C…+50°C with a supply of 100-240 VAC, -10°C…+50°C with a supply of 24 VDC
Storing temperature	-30°C…+70°C
Weathering resistance	relative humidity 0-75% on years average without dew
EMV	EN 61326
CE-marking	conformity according directive 2014/30/EU
Safety regulations	according to low voltage directive 2014/35/EU; EN 61010; EN 60664-1

10. Safety advices

Please read the following safety advices and the assembly chapter 2 before installation and keep it for future reference.

Proper use

The **IMG-AU**-device is designed for the evaluation and display of sensor signals.

Danger! Careless use or improper operation can result in personal injury and/or damage the equipment.

Control of the device

The panel meters are checked before dispatch and sent out in perfect condition. Should there be any visible damage, we recommend close examination of the packaging. Please inform the supplier immediately of any damage.

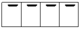
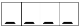
Installation

The **IMG-AU**-device must be installed by a suitably qualified specialist (e.g. with a qualification in industrial electronics).

Notes on installation

- There must be no magnetic or electric fields in the vicinity of the device, e.g. due to transformers, mobile phones or electrostatic discharge.
- **The fuse rating of the supply voltage should not exceed a value of 6 A N.B. fuse**!
- Do not install **inductive consumers** (relays, solenoid valves etc.) near the device and **suppress** any interference with the aid of RC spark extinguishing combinations or free-wheeling diodes.
- Keep input, output and supply lines separate from each other and do not lay them parallel with each other. Position “go” and “return lines” next to one another. Where possible use twisted pair. So, the best measuring results can be received.
- Screen off and twist sensor lines. Do not lay current-carrying lines in the vicinity. Connect the **screening on one side** on a suitable potential equaliser (normally signal ground).
- The device is not suitable for installation in areas where there is a risk of explosion.
- Any electrical connection deviating from the connection diagram can endanger human life and/or can destroy the equipment.
- The terminal area of the devices is part of the service. Here electrostatic discharge needs to be avoided. Attention! High voltages can cause dangerous body currents.
- Galvanically isolated potentials within one complex need to be placed on an appropriate point (normally earth or machines ground). So, a lower disturbance sensibility against impacted energy can be reached and dangerous potentials, that can occur on long lines or due to faulty wiring, can be avoided.

11. Error elimination

	Error description	Measures
1.	The unit permanently indicates overflow. 	• The input has a very high measurement, check the measuring circuit. • The display range of 999 respectively the preset measuring range was exceeded, control the supporting points respectively the selected input type and signal range. Not all of the activated supporting points are parameterised. Check if the relevant parameters are adjusted correctly.
2.	The unit permanently shows underflow. 	• The input has a very low measurement, check the measuring circuit. • The display range of -1999 respectively the preset measuring range was undercut, control the adjustments. • Not all of the activated supporting points are parameterised. Check if the relevant parameters are adjusted correctly.
3.	The device shows *LBR* in the 7-segment display.	• Check if the selected input type is correct. Only temperature measurements and 4…20 mA show these kind of error indication. • Check the wiring regarding a contact and correct connection.
4.	The device shows *HELP* in the 7-segment display.	• The device has detected an error in the configuration memory, operate a reset to default values and configurate the device according to your application.
5.	Parameter for the parameterisation of the input are not available.	• The programming interlock is activated. • Enter correct code.
6.	The device shows *ERR1* in the 7-segment display.	• Contact the manufacturer if errors of this kind occur.
7.	The device does not react as expected.	• If you are not sure, if the device has been parameterised before, restore the delivery state as described in *chapter 7*.
8.	There are higher constant errors of indication at thermocouple measurement.	• Remove strong heat or cold sources from the direct surroundings of the device. • Reduce the contact rating of the relay switching points onto preferably under 10 mA, as higher switching current lead to an increased local warming and thus to a massive error at the reference junction measurement. • If the variations during operation are permanent and constant, the reference junction measurement can be corrected via the offset.